TITLE: Development of camera-based real time smart phone dictionary

SPONSER: Unknown, potential sponsor would be Google, Motorola, Samsun or HTC. Domestic cell phone companies are also welcomed.

BACKGROUND: Cell phones are widely used these days and their functionalities are more and more generalized. As the processors are operated at a higher frequency with higher resolution cameras, plus the touch screen, today's cell phone can accomplish works that are formerly applicable only on computers and other electronics devices. Even more, as cell phones are way smaller in size and lighter in weight compared to computers, they are even more convenient with hand-held applications.

One of these kinds of hand-held applications is dictionary. As the globalization continues, English is becoming more and more important. For engineers, being able to quickly read and understand English journals and technology magazines is an essential to success. Cell phones share lots of attributes to become a good carrier of electronic dictionaries: its great portability, longer stand-by time and most importantly, everyone carriers a cell phone with them wherever they go.

Thus, what we want to accomplish is a camera-based real time dictionary, where people can hold their cell phone over the document and use their finger touch the word that they want to look up on the screen and the cell phone would automatically recognized the word.

The main idea of this application is based on the observation that mainstream smart phones these days do not have hardware keyboard but visual QWERT keyboard instead. However as visual QWERT keyboard does not have any pressing feedback to the users; it's hard to type precisely, especially when the users are not familiar with the spelling of the word, not along when the user doesn't even know the word. With all above reasons, searching words in dictionary using visual QWERT keyboard as input method is extremely tiring and time consuming. Such inconveniences would disrupt user's reading continuity experience because it takes so long to look up for a single word while user may have already forgot the context environment that they want to look up the word at the first place.

In a nutshell, we want to develop a smart phone application, which is a camera-based real time dictionary.

PURPOSE: The purpose of this project is to develop a camera-based real time dictionary application for either iphone or android or even both. The project will consist of an iphone or android phone with camera. Our goal is to provide a dictionary application that utilizes the camera on the cell phone to obtain the real time image and then parse the image to get the word and finally look it up in the internal dictionary database to get the translation result. If the project goes well, we may also consider adding functionalities like sentence translation or even paragraph translation.

Specific tasks involved will be: 1) Learn the development environment of android or iphone, as well as its camera APIs. 2) Generate the image-processing algorithm to decouple environmental noise as well as to distinguish distinct images so that the program will only parse the image if it has noticed there is a significant change in camera screen and thus saves power. 3) Generate image-processing algorithm to parse out the word or even sentence from the camera screen. 4) Generate look up algorithm to look up in the dictionary and give feedback to 3) in order to further improve the accuracy. 5) Find optimized algorithm to further improve the loop of 2) 3) 4) to improve the accuracy and performance of this looping up process. 6) Write the

dictionary database. 7) (Optional) Find word translation selection algorithm to select to most close meaning of the word according to the sentence environment and rearrange the translated wording meaning to provide sentence translation. 8) (Optional) Link the application to Google Scholar to provide technical look up as well.

Our constraints are: 1) Fluent user experience. Our application should be easy to use; should response fast; should be precise. 2) Power saving ability. Our application should defer work and smartly switch to idle or sleep mode if it's not working, which means we need to smartly detect idle environment and staging (amortising) our computational effort. 3) Functionality. Our application should be well modulized for future development.

OUTCOME: Final outcome should be a complete software features camera-based dictionary. The power durability should be 2 hours+ and the user interface should be fluent and friendly. We aim to sell this application on either android market or apple's app store.

TEAM: 4 ECE students (1 with image processing skills, 1 with algorithm skills, 1 with device driver and operating system skills and 1 with data base skills) and 1 IOE student (User experience and tester as well as project manager):
Hongyi Xin - CE/ECE
Meng Wu - EE/ECE
Yaoyu Tao - EE/ECE
Hao Shi – EE/ECE
Zhuoxin Chen – IOE/ECE